TITLE OF THE INVENTION

ROOF STEP SYSTEM

This application claims priority from U.S. Provisional Application Serial No. 60/174,714 filed January 6, 2000. The entirety of that provisional application is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to a step system for providing a toehold/slide guard on inclined surfaces, such as a roof.

Discussion of the Background

Providing a safe and secure foothold for workers working on an inclined surface, such as a roof, has been a concern in the construction industry for years. The most common method for providing a foothold on a roof today is by nailing a 2 x 4 (as used herein, 2″ x 4″ refers to a 2 inch by 4 inch piece of lumber) directly to the roof. This method has several disadvantages. First, nailing a 2 x 4 to the roof creates holes in existing roofing materials. Second, because there is no protective material surrounding the 2 x 4, workers using the 2 x 4 as a toehold/slide guard will often dislodge granular material that is attached to roof shingles. Third, the lack of protective material around the roof step allows soil and other debris from workers' shoes to be deposited on the roof.

The above identified short comings associated with the use of a 2 x 4 for toeholds/slide guards has led to the development of a number of alternative systems. These alternative systems can generally be classified into one of two

categories: 1) ladder-like roofing systems; and 2) platform systems. Ladder-like systems generally provide steps, similar to a ladder, that are intended to allow a worker to climb the roof. An example of a ladder-like system is the system described in UK Patent No. 2,131,475. Systems such as these provide a number of steps, spaced approximately the same distance as steps in a ladder. One drawback to the system proposed in UK Patent No. 2,131,475 is that the system is comprised of a rigid board, which makes the system cumbersome for use on a roof. Another example of a ladder-like system is disclosed in U.S. Patent No. 2,708,543. This system discloses a number of triangular steps attached to a flexible rubber/foam backing board. Although this system has the advantage of providing a flexible backing, it still suffers from the relative disadvantage of being heavy and cumbersome for use on a roof. More importantly, both of these ladder-like systems do not provide toeholds that are spaced sufficiently far enough apart to allow a worker to kneel between successive, or neighboring, toeholds. Thus, while such ladder-like systems are useful for climbing a roof, such systems are not as useful for a roofer who needs to kneel while perched on a toehold to install roofing shingles.

The second type of alternative roofing systems are platform based roofing systems. An example of a platform based roofing system is disclosed in U.S. Patent No. 4,946,123. This system consists of an angled bracket that holds a 2 x 4 at an angle with respect to the roof to provide toehold. This system suffers from many of the same drawbacks associated with using a single 2 x 4, including the necessity of driving nails through the bracket to secure the bracket to the roof.

Several more complicated platform systems are also known in the art, including those described in U.S. Patent No. 4,785,606; U.S. Patent No. 5,908,083; and U.S. Patent No. 5,624,006. These systems all provide good working surfaces, but are complicated and clumsy for use on a roof. Variations on the platform based systems are mobile platforms that can be attached to a worker's feet such as the platform described in U.S. Patent No. 3,726,028 and UK Patent No. 2,131,475. Systems such as these are also cumbersome to use on a roof. What is needed is a light weight, easy to use system that provides a toehold/slide guard for a worker that will allow the worker to kneel on the roof in order to perform tasks such as installing shingles.

SUMMARY OF THE INVENTION

The present invention overcomes to a great extent the deficiencies found in the prior art discussed above by providing a step system comprising a number of spaced apart steps attached to a connecting material, wherein the steps are spaced sufficiently far apart to allow an adult to kneel between neighboring steps. In preferred embodiments, the connecting material is a light weight nylon and the steps are formed from high strength, light weight plastic. Highly preferred embodiments of the present invention employ a woven nylon material, approximately 900-1,000 denier. This type of fabric has been found to exhibit exceptional traction when used on asphalt shingles. The material is preferably solid. Besides providing traction on the roof surface, the use of a "solid" material also protects the roof both from dirt and other debris and from worker's shoe which

tends to dislodge the granular material found on many asphalt shingles. The connecting material may be provided with a number of grommets, suitable for attaching the connecting material to the roof. In preferred embodiments of the invention, the step system is of sufficient length such that it can be draped over the entire roof and secured in sections to the roof. In preferred embodiments, the step includes a handle, which may also be used to secure a life line to the step. Preferably, the steps are separated by approximately 20 inches to approximately 36 inches, which is generally sufficient to provide room for a worker to kneel using one step as a toehold/slide guard. The step system may be any width, but as preferably between approximately 18 inches to approximately 50 inches wide, which is generally sufficiently wide to provide a toehold for both of a worker's feet.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant features and advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection the accompanying drawings, wherein:

Figure 1 is a perspective view of a roof step system according to the present invention in use on a roof.

Figure 2 is a bottom view of the roof step system of Figure 1.

Figure 3 is a top view of the roof step system of Figure 1.

Figure 4 is an enlarged top view of a portion of the roof step system of Figure 1.

Figure 5 is a front view of the roof step system of Figure 1.

Figure 6 is a side view of the roof step system of Figure 1.

Figure 7 is a perspective view of a preferred embodiment of the roof step according to the present invention.

Figure 7A is a perspective view of a functional application of the preferred embodiment shown in Figure 7.

Figure 8 is a perspective view of another preferred embodiment of the roof step according to the present invention.

Figure 9 is a perspective view of yet another preferred embodiment of the roof step according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like reference numerals designate identical or corresponding parts throughout the several views, a perspective view of a roof step system 100 installed on the roof 10 of a building 20 is shown in Figure 1. A worker 30 is using the roof step system 100 to install shingles 12. As shown in Figure 1, the roof step system 100 extends over the peak of the roof 10. The roof step system may be attached to the other side of the roof before the shingles are attached to that side, or may extend entirely over the other side of the roof and be attached at a place on the house, thereby avoiding the necessity of creating holes in the roof 10 sheathing. The spacing between successive steps 130

on the roof system 100 allows the worker 30 to kneel between successive steps 130. The step system 100 also protects installed shingles 12 from being scuffed and dirtied by the worker's feet.

Figure 2 is a bottom view of the roof step system 100. Figure 2 illustrates the connecting material 110. The connecting material 110 may be any material that is sufficiently strong to connect the step. In preferred embodiments, the material 110 is solid, or closed (as used herein, a solid or closed material is a material of a sufficiently dense weave such that dirt and other debris is prevented from passing through the material 110). However, other types of material may also be used. These other types of material may include open nets or meshes. It is also possible to use two thin strips of material spaced apart such that the strips of material are attached to opposite ends of a step 100. In a highly preferred embodiment of the present invention, the connecting material is made from a heavy gauge (900 to 1,000 denier) nylon pack cloth. This material has been found to exhibit excellent traction on commonly used asphalt roof shingles. As can be seen with reference to Figure 3, in an even more highly preferred embodiment of the invention, the fabric 110 is reenforced by thin nylon strips 120, comprised of a 2 inch wide 6000 lb. break strength nylon/seat belt webbing for added strength.

Still referring to Figure 3, a distance D separates the toehold 134 of one step 130 from the start of a successive step 130. The distance D is chosen to allow a worker to kneel between successive steps 130. Preferably, the distance D is between approximately 20 inches and approximately 36 inches.

Referring now to Figure 4, it can be seen that the reenforcing strips 120 include grommets 140. The grommets are used to secure the step system 100 to a nail, screw, or other object. Experience has shown that in many situations, a single grommet 140 on each side of the top of the step system 100 is sufficient to secure the step system 100. This is partially due to the excellent traction provided by the connecting material 110. However, a plurality of grommets 140 are provided to allow multiple screws or nails to be used to secure the step system 100 to the roof for the sake of safety; especially when the step system 100 is used on an uncovered plywood roof. The multiple grommets 140 also allow the roof step system 100 to be attached to a roof at a number of different points.

The step 130 is attached to the connecting material 110 by 6000 pounds of nylon seat belt webbing 120. In the embodiment shown in Figure 4, two slots 138 per side are used to attach the step 130 to the connecting material 110 through the reenforcing strip 120. Any number of fasteners other than nylon seat belt webbing 138 could be used to secure the step 130 to the connecting material 110, but nylon seat belt webbing is preferred because the nylon webbing 120 has low profile on the opposite side of the material 110.

The step 130 includes a base 132 having a width W. The width W is chosen to prevent the step 130 from tipping over when used as a toehold/slide guard. In preferred embodiments, the width W is approximately 8 inches. The width W of the connecting material is approximately 10 inches to approximately 30 inches wide. More preferably still, the step 134 may be comprised of an

textured plastic, which has been shown to provide surprisingly good traction, especially when sneakers are worn.

Referring now to Figure 5, it can be seen that the step 130 includes a toehold 134 of a height H. In preferred embodiments, the height H is equal to approximately 4 inches. Greater heights H are also possible, but the use of greater heights would require an increase in the width W of the base 132 of the step 130. Also shown in figure 5 is a handle 136, which is formed by removing portions of the toehold 134. The handle 136 provides a convenient surface for a worker to grab. The handle 136 may also be used to provide a point at which a life line could be attached to the step system 100. Such a life line is intended to be a short, e.g., 6 foot, life line. A short life line such as this prevents the step system 100 from being exposed to excessive force in the event that a worker should lose his footing. Another advantage of a short life line is convenience of use.

The step 130 is preferably comprised of a high strength, light weight plastic. Of course, other materials could also be used. For example, steps comprised of aluminum, steel and/or vulcanized rubber are also possible. It should also be noted that it is possible to use the solid nylon seat belt webbing 6000 pounds connecting material 110 without steps 130. Used in this manner, the connecting material 110 provides good traction while keeping the roof 10 clean.

As shown in Figures 5 and 6, the toehold 134 is solid other than the cutout for the handle 136. One advantage to this arrangement is that the toehold 134 can be used by a worker 30 as a tool rest as shown in Figure 1.

Further as shown in Figure 7, in a preferred embodiment of the step 130, the base 132 includes keyhole-shaped sleeves 142 that are designed to permit passage of a nail, screw, or other fastener (not shown), in order to secure the step 130 to the roof surface. The keyhole shape allows the step 130 to be removed from the fastener without having to remove and reinstall the fastener, or without having to remove the fastener and patch or repair the hole left by the removed fastener. Furthermore, the keyhole-shaped sleeve 142 permits step 130 when installed to be anchored in place by sliding the step 130 so that the fastener passes through the narrow portion of keyhole-shaped sleeve 142. In the example shown in Figure 7, it is anticipated that 1.5 inch #10 Phillips head screws will be used, and upon removal of the step 130, the screws are simply countersunk into the roofing material to maintain an impervious surface.

A further advantage to the preferred embodiment shown in Figure 7 is that individual roof steps may be placed in irregular patterns as conditions require. As shown in Figure 7A, at the discretion of the user, connecting material 110 may be used between individually placed steps 130.

Figure 8 displays another preferred embodiment of the step 130, wherein the step is especially suitable for use on vertical or steeply pitched planes. In the preferred embodiment shown in Figure 8, toehold 134 has non-skid surface 144 which permits the user to maintain stable footing while working on the vertical or steeply pitched plane. In the preferred embodiment shown in Figure 8, the non-skid surface 144 is provided through a pattern of molded knurls, but the non-skid surface can also be provided through the use of applique, sand paint, or other

techniques familiar to persons of ordinary skill in the art. Keyhole-shaped sleeves 142 are preferably placed relatively close to toehold 134, to minimize the stress on the fasteners (not shown) that are used to attach step 130 to the roof or steeply pitched plane.

Turning to Figure 9, a further preferred embodiment of the step 130 is shown, wherein the overall length of the step is increased, to permit extensive lateral movement by the user. The preferred embodiment shown includes multiple keyhole-shaped sleeves 142, preferably placed at construction industry-relevant standardized intervals such as 16 inches and 24 inches. The embodiment depicted in Figure 9 further includes non-skid surface 144, and one edge of step 130 includes ruler demarcations 146 to indicate length from any point along step 130. Multiple cutouts for handholds 136 permit one or more users conveniently and safely to carry the preferred embodiment shown. As shown in Figure 9, it is anticipated that the preferred embodiment of the step will be formed from 14 gauge cold-rolled or cold-drawn steel, but any material of sufficient strength, resilience, resistance to corrosion and other desirable properties, which will be obvious to those of ordinary skill in the relevant art, may be used.

While the invention has been described in detail in connection with the preferred embodiments known at this time, it should be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described but which are commensurate with the spirit and scope of the invention. Accordingly, the invention is not to be

seen as limited by the foregoing description, but is only limited by the scope of the appended claims.